

Notice of Allowability

Application No.

09/981,076

Examiner

Henry S. Hu

Applicant(s)

TILLOTSON ET AL.

Art Unit

1713

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to Amendment of May 27, 2005.
2. ☒ The allowed claim(s) is/are 9-17.
3. ☒ The drawings filed on 27 May 2005 are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date 5-27-05
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____

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DETAILED ACTION

1. Applicants' **Amendment** with corrected **Drawing** filed on May 27, 2005 was received. A **Declaration** written by Dr. Alexander E. Gash filed on May 27, 2005 was also received. With the amendment, elected Claims 9-17 were amended, while Claims 1-8 was originally cancelled as well as non-elected Claims 19-20 were previously cancelled. To be more specific, parent **Claim 9** was rewritten with support from specification (see page 4, line 6-17) to incorporate the limitations as producing "inorganic monolithic nanostructured metal-oxide aerogel or xerogel". Dependent **Claims 10-17** were made to use the same limitation accordingly as well as to correct the claim objections as suggested by the Examiner.

With respect to the specification objections (a) - (d), the Applicants have amended all the informalities as suggested by the examiner. The examiner thereby withdraws specification objections and Claim objections in the previous Office Action dated December 23, 2004. The examiner **accepts Applicants' newly corrected drawing in two sheets with Figures 1-3** filed with the amendment on May 25, 2005. **Claims 9-17 are pending now.** An action follows.

2. Claim rejections under Non-Final Office Action filed on December 23, 2004 are now removed for the reasons given in paragraphs 3-9 thereafter.

Allowable Subject Matter

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3. Claims 9-17 are allowed.

4. The following is an examiner's statement of reasons for allowance: The above Claims 9-17 are allowed over the closest references:

5. *The limitation of amended parent **Claim 9** of present invention relates to a sol-gel process for producing an inorganic monolithic nanostructured metal-oxide aerogel or an inorganic monolithic nanostructured metal-oxide xerogel, comprising:*

- (a) dissolving a metal salt in a solvent at least containing water to produce a solution;*
- (b) inducing sol formation;*
- (c) adding a proton scavenger to induce and control gelation for producing an inorganic gel;*
- (d) providing sufficient time for gel formation of said inorganic gel; and*
- (e) drying said inorganic gel to produce an inorganic monolithic nanostructured metal-oxide aerogel or an inorganic monolithic nanostructured metal-oxide xerogel.*

*See other limitations of dependent **Claims 10-17**.*

6. In view of the Applicants' amendment, parent **Claim 9** of present invention now relates to a sol-gel process for producing an inorganic monolithic nanostructured metal-oxide aerogel or xerogel. Such a sol-gel process involves a combination of five steps as specified, particularly in step (c) with a proton scavenger (epoxides such as propylene oxide, see page 4 at lines 12-13) being added to induce and control gelation. In order to be distinguished from prior

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art, a **Declaration** prepared by Dr. Alexander E. Gash filed on May 27, 2005 was submitted.

The involving prior art references in four different combinations for 103 rejections as “Ong et al. (US 5,698,483) or Imamura et al. (US 5,788,950), each individually in view of Braithwaite et al. (US 3,981,979) or Ryang et al. (US 5,962,608)” have been discussed in detail therein.

In a close examination on pages 12-13 of Remarks as well as pages 2-5 of Declaration, both two primary references including Ong and Imamura are **not related to make inorganic gel in view of mode and mechanism of gel formation**, as pointed out by the Applicants, due to the fact that Ong’s or Imamura’s preparation of nanostructured metal oxide powders is through different mechanism as: (A) the use of physical entrapment of inorganic precursors in an organic gel matrix such as from polymers, (B) followed by removal of the organic gel network at high temperature, and (C) decomposition of the precursors. In view of the instance Claim 1 in present application, such an organic/polymer gel network is not existed.

7. In a very close view, each of Ong and Imamura is also silent about using **step (c)** of **adding a proton scavenger such as epoxide to metal salt solution**. On one way, Braithwaite may teach that **lower aliphatic epoxide compounds** can be added with the metal oxide precursor such as aluminum salts, the advantage is such an addition would effectively result in the formation of alumina in the gel form. On the other way, Ryang may teach that **epoxy resins** can be added with the metal oxide precursor. The advantage is that epoxide groups can condense with the hydroxyl groups to form polymeric molecules, which vary in size according to the relative proportions of reactants and the reaction time. However, each of the secondary

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references including Braithwaite and Ryang cannot fix the deficiency from the primary reference Ong or Imamura. Additionally, the Applicants have pointed out organic component such as epoxide useful as a proton scavenger in step (c) may have a different function from the prior art as discussed on page 13 of Remarks.

8. In a close examination of those three references cited in the **IDS** filed on May 27 of 2005, the examiner has found none may be closer to present application. US Patent No. **6,270,836 B1 to Holman** only discloses the preparation of gel-coated microcapsules with improving mechanical stress- and flame-resistance by a sol-gel process from $M(OR)_n$ such as TMOS (abstract, line 1-4; column 5, line 4 – column 7, line 38). US Patent No. **5,855,827 to Bussing et al.** only discloses the preparation of nano-scale ceramic powdery materials for coating use by a Pulse Detonation Synthesis (PDS) process (column 4, line 9 – column 5, line 8). US Patent No. **6,296,678 B1 to Merzbacher et al.** only discloses the preparation of a long duration infrared-emitting material which is a combustible aerogel or other nanocellular substrate with iron metal impregnant formed by thermal decomposition of iron pentacarbonyl deposited on (abstract, line 1-8; column 3, line 31-48).

Additionally, the present invention has shown in examples along with some comparative examples for making **such an inorganic monolithic nanostructured metal-oxide aerogel or xerogel** through a sol-gel process with the addition of a proton scavenger (see pages 7-25 for **examples 1-21**, the control examples and **Tables 1-7**). Therefore, all the above-mentioned

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references, in combination or alone, does not teach or fairly suggest the limitations of present invention.

9. After further examination and search, the examiner found the following prior art did not teach the claimed limitation:

US Patent No. **6,472,467 B1 to Chiao** discloses the preparation of inorganic/organic compositions by using organic cross-linker dispersed in inorganic particles (abstract, line 1-7; column 5, line 19-62). Many types of organic cross-linker such as epoxide can be used (column 5, line 41-51). No claimed sol-gel process is disclosed or suggested (column 11, line 15-27).

10. The key issue, regarding making such an inorganic monolithic nanostructured metal-oxide aerogel or xerogel through a sol-gel process involves a combination of five steps as specified, particularly in step (c) with a **proton scavenger** being added to induce and control gelation, cannot be overcome by any or the combination of the above references, therefore, the present invention is novel.

11. As of the date of this office action, the examiner has not located or identified any reference that can be used singularly or in combination with another reference including the above references to render the present invention anticipated or obvious to one of the ordinary skill in the art. Therefore, the independent and parent process **Claim 9** is allowed for the reason

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listed above. Since the prior art of record fails to teach the present invention, the remaining pending dependent **Claims 10-17** are passed to issue.

12. Any inquiry concerning this communication or earlier communication from the examiner should be directed to Dr. Henry S. Hu whose telephone number is **(571) 272-1103**. The examiner can be reached on Monday through Friday from 9:00 AM –5:00 PM. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Wu, can be reached on (571) 272-1114. The fax number for the organization where this application or proceeding is assigned is (703) 872-9306 for all regular communications.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



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Patent Examiner, Art Unit 1713, USPTO

August 5, 2005



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